



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/736,073	12/13/2000	David J. Elliott	UV-102J	7710

7590 03/20/2006  
Iandiorio & Teska  
260 Bear Hill Road  
Waltham, MA 02451-1018

EXAMINER

CROWELL, ANNA M

ART UNIT PAPER NUMBER

1763

DATE MAILED: 03/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

09/736,073

**Applicant(s)**

ELLIOTT ET AL.

**Examiner**

Michelle Crowell

**Art Unit**

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 December 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-14, 16-20, 23-27, 29 and 34-37 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14, 16-20, 23-27, 29 and 34-37 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>12/05</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Status of Claims***

Claims 1-14, 16-20, 23-27, 29, and 34-37 are pending in the application. Claims 1-14, 16-20, 23-27, 29, and 34-37 are rejected.

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 19, 2005 has been entered.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

Art Unit: 1763

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-2, 4-13, 17-20, 24-25, 29, 34-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyagawa et al. (J.P. 62-047482A) in view of Elliott et al. (U.S. 5,814,156).

Referring to Drawing 1 and the abstract, Miyagawa et al. disclose a reactor comprising: a beam forming module 3 to transform a radiation source raw output into a beam; a gas injection module 4 to deliver at least one reactant gas to the substrate surface; a reaction chamber 12 with a window 6 through which the beam forming module projects the beam; a vacuum chuck 9 for holding the substrate; and a gas exhaust module 5 inside the chamber to remove reaction by-products and unreacted reactant gas from the substrate surface, wherein the gas injection module and the gas exhaust module are in close proximity to the beam, and wherein the beam, the gas injection module and the gas exhaust module are movable relative to the reaction chamber and the substrate surface.

Miyagawa et al. fail to specifically teach a UV radiation source transformed into a **rectangular** beam.

Referring to column 3, lines 39-42, Elliott et al. teach that it is conventionally known in the art for a beam forming module to transform a UV radiation source raw output into a rectangular beam. Additionally, Elliott et al. teach that it is conventionally known in the art for a UV radiation source to be used as the laser source in order to process a substrate at the appropriate energy (col. 1, lines 29-32, col. 4, lines 4-7, col. 6, lines 51-57, col. 7, lines 21-26, col. 8, lines 48-61). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention for the apparatus of Miyagawa et al. to use a UV radiation source that

Art Unit: 1763

transforms into rectangular beam as taught by Elliott et al. since it conventionally known in the art and UV light is a desired energy level to process a substrate.

With respect to claims 7-13 and 25, the apparatus of Miyagawa et al. discloses a deposition reaction; however, Miyagawa et al. is still further capable of administering the various claimed processes with the appropriate processing materials supplied to the chamber. (i.e. etching reaction, deposition reaction, oxidation reaction, reduction reaction, melting reaction, reaction for modifying a metallic or non-metallic film, polymerization or UV curing reaction, and doping reaction). Furthermore, a claim containing a “recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus” if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

With respect to claims 2 and 4-6, Miyagawa et al. fail to teach the wavelength of the UV radiation source raw output, energy level of the rectangular beam, optical elements, two cylindrical refractive elements.

Referring to column 4, lines 4-15, and column 5, lines 53-59, Elliott et al. teaches an apparatus which uses an ultraviolet radiation beam to clean (etch) the surface of a substrate. The laser source 22 provides a pulsed beam 24 (ultraviolet radiation beam) at wavelengths of 248 nm and 193 nm. Typical energy density levels at 248 nm range from 250-1500 mJ/cm<sup>2</sup> (0.25 – 1.5 J/cm<sup>2</sup>). The laser source 22 further includes a beam expanding system 26 (beam forming module) made up of two cylindrical mirrors 54 and 56 (two cylindrical refractive elements). It would have been obvious to one of ordinary skill in the art at the time of the invention to provide

Art Unit: 1763

the apparatus of Miyagawa et al. with the wavelength of the UV radiation source raw output, energy level of the rectangular beam, optical elements, and two cylindrical refractive elements as taught by Elliott et al. in order to ensure the appropriate wavelength and energy level necessary for the desired process. In addition, the cylindrical refractive elements (optical elements) create the rectangular beam in the desired dimension.

5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyagawa et al. (J.P. 62-047482A) in view of Elliott et al. (U.S. 5,814,156), as applied to claims 1-2, 4-13, 17-20, 24-25, 34-36 above, and further in view of Schmidt et al. (U.S. 4,624,330).

The teachings of Miyagawa et al. in view of Elliott et al. are discussed above.

Miyagawa et al. in view of Elliott et al. fails to teach the dimensions of the rectangular beam.

Referring to column 2, lines 47-52, Schmidt et al. shows an ultraviolet beam 6 directed on vessel 1 with a length of 600 mm and width of 1mm.

In *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Miyagawa et al. in view of Elliott et al. with the dimensions

Art Unit: 1763

as shown by Schmidt et al. in order to ensure the appropriate dimension of the rectangular beam necessary for the desired process.

6. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyagawa et al. (J.P. 62-047482A) in view of Elliott et al. (U.S. 5,814,156) as applied to claims 1-2, 4-13, 17-20, 24-25, 34-36 above, and further in view of Giapis et al. (U.S. 5,002,631).

The teachings of Miyagawa et al. in view of Elliott et al. are discussed above.

Miyagawa et al. in view of Elliott et al. fails to teach a block shaped manifold.

Referring to Figure 1 and column 3, lines 13-15, Giapis et al. teaches a valve-controlled aperture 103 (block shaped manifold) with pump used to exhaust out gaseous reaction products. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Miyagawa et al. in view of Elliott et al. with the valve-controlled aperture as taught by Giapis et al. in order for gaseous reaction products to be exhausted.

7. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyagawa et al. (J.P. 62-047482A) in view of Elliott et al. (U.S. 5,814,156) as applied to claims 1-2, 4-13, 17-20, 24-25, 34-36 above, and further in view of Lee et al. (U.S. 6,374,770).

The teachings of Miyagawa et al. in view of Elliott et al. are discussed above.

Miyagawa et al. in view of Elliott et al. fails to teach an electronic control module.

Referring to Figure 1 and column 4, lines 46-50, Lee et al. teaches a CVD apparatus which uses a processor 34 operated by a computer program stored in memory 38 for a deposition

Art Unit: 1763

reaction. The computer program selects the timing, mixture of gases, chamber pressure, chamber temperature, RF power levels, susceptor position, and other parameters of a particular process. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Miyagawa et al. in view of Elliott et al. with a processor as taught by Lee et al. in order to control various processing parameters to yield the optimum processing environment for deposition.

8. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyagawa et al. (J.P. 62-047482A) in view of Elliott et al. (U.S. 5,814,156) as applied to claims 1-2, 4-13, 17-20, 24-25, 34-36 above, and further in view of Murakami et al. (U.S. 6,090,458).

The teachings of Miyagawa et al. in view of Elliott et al. are discussed above.

Miyagawa et al. in view of Elliott et al. fails to specifically teach the vacuum chuck includes a heating element.

Referring to column 4, lines 33-36, Murakami et al. teaches a heating element is included in the vacuum chuck in order to balance the temperature of the substrate with the temperature of the reactive gas as well as control the volume of the reactive gas molecules adsorbed to the surface of the substrate. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the vacuum chuck of Miyagawa et al. in view of Elliott et al. with a heating element as taught by Murakami et al. chuck in order to balance the temperature of the substrate with the temperature of the reactive gas as well as control the volume of the reactive gas molecules adsorbed to the surface of the substrate.



Art Unit: 1763

9. Claims 1-2, 4-13, 16-20, 24-25, 27, 29, and 34-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oki et al. (J.P. 07-111246A) in view of Hama (J.P. 63-153277A) and Elliott et al. (U.S. 5,814,156).

Referring to Drawing 1 and paragraphs [0009]-[0021], Oki et al. disclose a reactor comprising: a beam forming module 11 to transform a radiation source raw output into a beam (par. [0010]); a gas injection module 31 to deliver at least one reactant gas to the substrate surface 33 (par. [0012]); a reaction chamber 30 with a window 34 through which the beam forming module projects the beam (par. [0012] & [0016]); a vacuum chuck 37 for holding the substrate (par. [0012]); and a gas exhaust module 32 inside the chamber to remove reaction by-products and unreacted reactant gas from the substrate surface (par. [0012]); wherein the gas injection module and the gas exhaust module are in close proximity to the beam (Drawing 1).

Oki et al. fail to specifically teach a **UV** radiation source transformed into a **rectangular** beam.

Referring to column 3, lines 39-42, Elliott et al. teach that it is conventionally known in the art for a beam forming module to transform a UV radiation source raw output into a rectangular beam. Additionally, Elliott et al. teach that it is conventionally known in the art for a UV radiation source to be used as the laser source in order to process a substrate at the appropriate energy (col. 1, lines 29-32, col. 4, lines 4-7, col. 6, lines 51-57, col. 7, lines 21-26, col. 8, lines 48-61). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention for the apparatus of Miyagawa et al. to use a UV radiation source that transforms into rectangular beam as taught by Elliott et al. since it conventionally known in the art and UV light is a desired energy level to process a substrate.

Art Unit: 1763

Oki et al. fail to teach that the beam, the gas injection module and the gas exhaust module are movable relative to the reaction chamber and the substrate surface.

Referring to Drawing 1 and the abstract, Hama teaches that it known to move a beam and nozzle 6 across a stationary substrate surface 3 in order to permit processing over a large area substrate without moving the substrate. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to alternatively move the beam, gas injection module, and the gas module of Oki as taught by Hama since this permits processing over a large area substrate without moving the substrate.

With respect to claims 7-13 and 25, the apparatus of Oki et al. discloses a deposition reaction; however, Oki et al. is still further capable of administering the various claimed processes with the appropriate processing materials supplied to the chamber. (i.e. etching reaction, deposition reaction, oxidation reaction, reduction reaction, melting reaction, reaction for modifying a metallic or non-metallic film, polymerization or UV curing reaction, and doping reaction). Furthermore, a claim containing a “recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus” if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

With respect to claims 2 and 4-6, Oki et al. fail to teach the wavelength of the UV radiation source raw output, energy level of the rectangular beam, optical elements, two cylindrical refractive elements.

Referring to column 4, lines 4-15, and column 5, lines 53-59, Elliott et al. teaches an apparatus which uses an ultraviolet radiation beam to clean (etch) the surface of a substrate. The laser source 22 provides a pulsed beam 24 (ultraviolet radiation beam) at wavelengths of 248 nm and 193 nm. Typical energy density levels at 248 nm range from 250-1500 mJ/cm<sup>2</sup> (0.25 – 1.5 J/cm<sup>2</sup>). The laser source 22 further includes a beam expanding system 26 (beam forming module) made up of two cylindrical mirrors 54 and 56 (two cylindrical refractive elements). It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Oki et al. with the wavelength of the UV radiation source raw output, energy level of the rectangular beam, optical elements, and two cylindrical refractive elements as taught by Elliott et al. in order to ensure the appropriate wavelength and energy level necessary for the desired process. In addition, the cylindrical refractive elements (optical elements) create the rectangular beam in the desired dimension.

10. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oki et al. (J.P. 07-111246A) in view of Hama (J.P. 63-153277A) and Elliott et al. (U.S. 5,814,156) as applied to claims 1-2, 4-13, 16-20, 24-25, 27, 29, and 34-37 above, and further in view of Schmidt et al. (U.S. 4,624,330).

The teachings of Oki et al. in view of Hama and Elliott et al. are discussed above.

Art Unit: 1763

Oki et al. in view of Hama and Elliott et al. fails to teach the dimensions of the rectangular beam.

Referring to column 2, lines 47-52, Schmidt et al. shows an ultraviolet beam 6 directed on vessel 1 with a length of 600 mm and width of 1mm.

In *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Oki et al. in view of Hama and Elliott et al. with the dimensions as shown by Schmidt et al. in order to ensure the appropriate dimension of the rectangular beam necessary for the desired process.

11. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oki et al. (J.P. 07-111246A) in view of Hama (J.P. 63-153277A) and Elliott et al. (U.S. 5,814,156) as applied to claims 1-2, 4-13, 16-20, 24-25, 27, 29, and 34-37 above, and further in view of Giapis et al. (U.S. 5,002,631).

The teachings of Oki et al. in view of Hama and Elliott et al. are discussed above.

Oki et al. in view of Hama and Elliott et al. fail to teach a block shaped manifold.

Art Unit: 1763

Referring to Figure 1 and column 3, lines 13-15, Giapis et al. teaches a valve-controlled aperture 103 (block shaped manifold) with pump used to exhaust out gaseous reaction products. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Oki et al. in view of Hama and Elliott et al. with the valve-controlled aperture as taught by Giapis et al. in order for gaseous reaction products to be exhausted.

12. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oki et al. (J.P. 07-111246A) in view of Hama (J.P. 63-153277A) and Elliott et al. (U.S. 5,814,156) as applied to claims 1-2, 4-13, 16-20, 24-25, 27, 29, and 34-37 above, and further in view of Lee et al. (U.S. 6,374,770).

The teachings of Oki et al. in view of Hama and Elliott et al. are discussed above.

Oki et al. in view of Hama and Elliott et al. fail to teach an electronic control module.

Referring to Figure 1 and column 4, lines 46-50, Lee et al. teaches a CVD apparatus which uses a processor 34 operated by a computer program stored in memory 38 for a deposition reaction. The computer program selects the timing, mixture of gases, chamber pressure, chamber temperature, RF power levels, susceptor position, and other parameters of a particular process. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Oki et al. in view of Hama and Elliott et al. with a processor as taught by Lee et al. in order to control various processing parameters to yield the optimum processing environment for deposition.

Art Unit: 1763

13. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oki et al. (J.P. 07-111246A) in view of Hama (J.P. 63-153277A) and Elliott et al. (U.S. 5,814,156) as applied to claims 1-2, 4-13, 16-20, 24-25, 27, 29, and 34-37 above, and further in view of Murakami et al. (U.S. 6,090,458).

The teachings of Oki et al. in view of Hama and Elliott et al. are discussed above.

Oki et al. in view of Hama and Elliott et al. fails to specifically teach the vacuum chuck includes a heating element.

Referring to column 4, lines 33-36, Murakami et al. teaches a heating element is included in the vacuum chuck in order to balance the temperature of the substrate with the temperature of the reactive gas as well as control the volume of the reactive gas molecules adsorbed to the surface of the substrate. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the vacuum chuck of Oki et al. in view of Hama and Elliott et al. with a heating element as taught by Murakami et al. chuck in order to balance the temperature of the substrate with the temperature of the reactive gas as well as control the volume of the reactive gas molecules adsorbed to the surface of the substrate.

#### ***Response to Arguments***

14. Applicant's arguments with respect to claims 1-4, 16-20, 23-27, 29, and 34-37 have been considered but are moot in view of the new ground(s) of rejection.


Art Unit: 1763


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Crowell whose telephone number is (571) 272-1432. The examiner can normally be reached on M-F (9:30 -6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Michelle Crowell  
Patent Examiner  
Art Unit 1763



  
Parviz Hassanzadeh  
Supervisory Patent Examiner  
Art Unit 1763